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Recent Advances in Water-conserving Plumbing Products

Plumbing products, including toilets, showers, and faucets, account for 60% of the water use in a home. According to US Environmental Protection Agency (USEPA) estimates, if all US households installed water-efficient appliances, each year more than 3 trillion gal of water and more than \$18 billion would be saved.

Both government and businesses have recognized for some time that the bathroom presents a great opportunity for conservation. Successful reductions in water consumption have resulted from new developments in toilets over the years: from 7 to 5 gpf, from 5 to 3.5 gpf, and, most recently, from 3.5 gpf to the current 1.6 gpf US standard low-flow toilet.

This last reduction, which occurred in 1994 as a result of the Energy Policy Act of 1992, was not as smooth as previous initiatives. The impact of less water on existing product designs was not clearly understood at the time of the government mandate. Although the result was just a few years of toilets with unsatisfactory performance, given the rate of new construction at the time, the impact was long-lasting.

Similar circumstances occurred with the first generation of low-flow showerheads and faucets. They delivered water savings—but only with a compromise in perfor-

mance. The compromise did not go unnoticed by consumers, many of whom are still wary of water-conserving plumbing products.

The plumbing industry caught up fast, hiring scientists as part of their product development teams and using advanced fluid dynamics to radically change how plumbing products are designed and manufactured. Today's generation of water-conserving plumbing products are completely re-engineered to deliver conservation without compromise. Now the challenge to those working for the cause of greater water efficiency is to win back the trust of end-users, installers, and legislators.

Government incentives in the form of rebates are a proven success, encouraging the purchase of water-conserving products in many states and municipalities. Yet the concept of "cash for flushers" has yet to catch on among the federal green dollars being allocated.

This is likely partly because of performance doubts. Shortly after Georgia Governor Sonny Perdue announced his Georgia Water Stewardship Act of 2010 in February, which would require more-efficient water fixtures in all new residential and commercial construction statewide, a comment appeared under the story on the *Atlanta Journal-Constitution* website: "I think they need to flush their water proposal down the water-saving toilets."

Convincing metropolitan Atlanta's 4 million residents to retrofit their bathrooms for water efficiency would save Georgia families in two ways: It would reduce their household water bills, and it would mitigate the need for taxpayer-funded reservoirs and treatment facilities. The region is under threat—it recently emerged from a severe long-term drought, and long-term water issues remain a critical situation in the region as a result of rapid growth over the past 20 years. Atlanta also faces a federal judge's deadline to drastically cut its use of the city's main drinking water source by 2012. "Metro Atlanta is facing a critical water shortage in just a few years if habits and infrastructure do not change," said Tommy Linstroth, principal at Savannah, Georgia-based Trident Sustainability Group.

TESTING THE SAVINGS IN METRO ATLANTA NEIGHBORHOODS

Linstroth recently teamed up with Nick Marine, Georgia's first licensed GreenPlumber, to conduct a water-efficiency test in 21 suburban Atlanta homes. The objective was to prove that high-efficiency plumbing products carrying USEPA's WaterSense® label and/or those tested by respected third party agencies can be trusted to save water without sacrifice.

The mass retrofit included replacing 71 toilets, 96 faucets, and

55 showerheads in 71 bathrooms. The mix of homeowners ranged from single residents to families with children to older residents. The mix included suburban homes of varying size, age, and design.

American Standard provided the products and solicited volunteers in the Serenbe community of Chattahoochee Hills and in Chastain Lakes in Kennesaw. In exchange for free upgrades to WaterSense-certified toilets and bathroom faucets and high-efficiency showerheads, the 21 participating families are sharing water bills and daily water use habits with Linstroth, who is measuring and reporting on water savings as well as user satisfaction.

The two neighborhoods chosen for the American Standard program represent different ends of the spectrum for green building. Serenbe, located south of Atlanta, was developed as an ecosensitive community where the majority of land is set aside for conservation and residents have a heightened sensitivity toward environmental concerns. Homes at Serenbe were built within the past five years and were designed to EarthCraft House™ standards with advanced energy savings and existing plumbing code standards.

The Chastain Lakes community, located northwest of Atlanta, was built more than 20 years ago, predating current water-efficiency standards that took effect in 1994. Chastain is located in Georgia's Cobb County, where \$300 rebates go a long way toward offsetting the initial upfront cost for technology behind the improved performance.

INITIAL READINGS TAKEN ONE TO TWO MONTHS AFTER INSTALLATION

Linstroth consistently documented at least a 20% collective savings in overall water use at Serenbe over two months. Serenbe homeowners had toilets that used up to 1.6 gpf, bathroom faucets that had a flow-rate of 2 gpm, and showerheads with usage not exceeding 2.5 gpm.

At the older Chastain Lakes suburb, Linstroth documented at least a 25% savings from the retrofit after just one month of water usage data. "We would expect results in Chastain to be higher, because there were still old toilets in those homes. The math alone would dictate a near 50% reduction using siphonic dual-flush toilets in place of those old 3.5 gallon toilets," Linstroth said. Linstroth plans to release a second report late this spring after compiling more months of data from the participating homeowners.

More important, however, is that the level of homeowner satisfaction has been higher than expected. American Standard has not received a single request to return to the higher-consumption products, and several volunteers reported that the products exceeded their expectations—not to mention the performance of their previous higher-consumption products.

"Our showerheads seem to have better water pressure," reported Serenbe homeowner Dallas Nevins, two months after installation. "In the past, we've had to pull the plunger out on more than one occasion. Since we've had our new toilets, we've yet to run into a problem and have been 'plunge-free,'" continued Nevins, an allied member of the American Society of Interior Designers.

"I can't tell any difference with the volume of water in the shower and sinks, which is great. . . I was afraid I would get a dribble," said Serenbe homeowner Tom Reed.

"I am anxious to let you know that I am thrilled with the upgraded performance of my toilets and sinks! The difference in performance between now and before is astounding. So much more than I expected or hoped for," said Serenbe homeowner Donna Nichols.

CALLING MORE GEORGIANS— AND AMERICANS—TO A CULTURE OF WATER CONSERVATION

In announcing his water efficiency legislation, Perdue said he's call-

ing Georgians to a "culture of conservation," noting that "We're going to ask you to make commitments that we have never asked of Georgians before," according to a Feb. 4, 2010, article on southernpoliticalreport.com.

Perhaps the path of least resistance is to educate Georgians and others that a culture of conservation doesn't have to mean a culture of deprivation. In an article in *Wholesaler* magazine last March, Steve Lehtonen, managing director of Sacramento, California-based GreenPlumbers North America, said his organization has not received any feedback on poor toilet performance since its US launch in early 2008. "Some plumbers had misgivings at first, but these new high-efficiency toilets are performing well," Lehtonen said. "We're definitely not getting any negative response from consumers."

"The good news is that WaterSense and the 'green' movement is now catching on with most everybody," said John Murphy, president of the National Association of Plumbing Showroom Professionals. "Many of today's toilets are comparable to the 1970s five-gallon toilets. We sell these toilets with confidence."

The Georgia Environmental Facilities Authority estimates that if just 25% of Georgia households replaced their existing toilets and bathroom faucets with the same WaterSense-certified fixtures and faucets used in Serenbe and Chastain Lakes, it could save the state nearly 10 bil gal of water per year. It's up to us now to get the word out to gain back the trust of end-users, installers, and legislators.

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